

Market Opportunities for Food Uses of Kentucky Soybeans

Prepared for the

Kentucky Soybean Promotion Board

Debbie Ellis, Executive Director

Chris Kummer, Project Director

P.O. Box 30 Princeton, KY

Tel: (800) 232-6769

and the

Kentucky Agricultural Development Board

2002

Prepared by

Market Solutions LLC

4306 Leland Street, Suite 101

Chevy Chase, MD 20815

Tel.: (301) 654-2949

Fax: (301) 654-4742

Info@marketsrus.com

www.marketsolutionsllc.com



Executive Summary

- The Kentucky Soybean Association (KSA) retained Market Solutions LLC to conduct an analysis of the market potential for food ingredient uses of Kentucky soybeans with special emphasis on non-genetically modified (non-GM) soybeans. A preliminary assessment of the potential for establishing a processing plant for soybeans for food use in Western Kentucky, specifically in Simpson County is also being conducted. This report presents findings of the market analysis. A companion report presents findings of the pre-feasibility assessment. The Kentucky Soybean Promotion Board and the Kentucky Agricultural Development Board provided funding to KSA to support this project.

Domestic Market Opportunities

- With approval of the health claim for soy protein in reducing the risk of heart disease, and progress on improving the taste of soyfood products, the U.S. market for food products containing soy ingredients has been growing very rapidly. Kentucky producers looking for options to increase returns identified production and processing of non-GM soybeans for food uses as a promising alternative.
- Soy milk and other dairy substitutes, chilled and frozen meat substitutes, energy and nutrition bars and beverages are all seeing rapid growth in sales through mainstream supermarkets and restaurants around the country. Soy ingredients are also playing a bigger role in baking, meat processing and other mainstream food production because of their nutritional, functional and economic benefits.



Executive Summary

- A growing number of soy foods manufacturers and other food processors are looking for soy ingredients. Many are looking for products that do not contain genetically modified soybeans. A number are also looking for organic ingredients as well.
- An indication that soy-based foods have become mainstream is that major food companies like Kellogg, Kraft and Dean Foods are buying into the market. In some cases they are purchasing companies and products of successful natural foods suppliers and adding product development, distribution and advertising and promotion to build the market. Numerous small and medium sized companies are also developing soy products, some aimed at local and regional markets. Almost 400 new soyfood products were introduced in 2001.
- For Kentucky soybean producers there are a variety of opportunities to participate in the market growth, including:
 - Supplying cleaned whole soybeans with specific output characteristics to domestic or international customers.
 - Adding value to these soybeans through processing, such as producing specialty flakes, meal, flour or grits and oil to customer specifications.
 - Producing, marketing and distributing consumer products using Kentucky soybeans as an ingredient.



Executive Summary

- As Kentucky producer groups consider these opportunities it will be important to recognize that major commodity grain and oilseed processors are also increasing their investment in becoming soy ingredient suppliers to the soy foods industry and the food industry in general. These investments are an indication of the growth potential.
- Growing competition makes it important for new market entrants to pursue niche opportunities that minimize head-to-head competition with large players. Among some of the opportunities with promise:
 - Adding value by producing varieties of food soybeans for tofu, natto or other uses, with varieties that are well respected for their end-use traits and a rigorous system of traceability, non-GMO certification and identity preservation.
 - Supplying commodity ingredients like soy flour or textured soy products, focusing on regional companies and smaller customers who appreciate the responsiveness of local suppliers;
 - Offering specialty custom runs of ingredient products that cannot be easily or economically provided by large plants;
 - Providing specialized distribution and service especially to companies that large companies are not interested in servicing;
 - Producing specialty consumer products for retail and food service, working with regional businesses that want to feature local products and/or producing products to buyer specifications that can be labeled with store or restaurant brands.
- Success will require building a team that brings together specialized technical, management and sales expertise.



Executive Summary

International Market Opportunities

- Some Kentucky soybean producers are already taking advantage of opportunities to produce non-GMO food grade soybeans for the Japan market. This is a genuine long term market opportunity. If Kentucky producers can meet the requirements of the Japan market and sell directly, there is potential for good returns. Soybean prices in Japan are generally more than double U.S. prices, even higher for preferred varieties and organic production. Success in obtaining a larger share of those returns will involve added costs and risks. These must be carefully evaluated.
- Japan offers the highest end product value market for specialty food soybeans to those who can meet customer requirements and invest in building relationships for the longer term.
- Success will require production of varieties with the size, protein levels, oil content and end-product characteristics that customers are looking for. Producers will have to consider potential costs of production, harvesting, cleaning and transport, taking into account impacts on yields and the requirements to be able to certify products as non-GMO. Documentation and international payment will have to be arranged, with some negotiations likely to be in Japanese.
- It appears that Southwestern Kentucky could have some advantages in terms of transportation and long term relations between the Commonwealth of Kentucky and Japan upon which to build.



Executive Summary

Taking Advantages of Opportunities

- For any business organization or producer group interested in pursuing specific opportunities, the next steps by identifying the market objectives that are of highest interest with as much specificity as possible. This is the starting point in developing a business plan.
- The first step is to look at the varieties that can currently be grown. Whether the goal is to produce traditional non-GMO varieties for processing or specific food grade beans for tofu or natto, it is important to assess what can be produced and what additional costs are likely to be involved. What kind of return will be necessary to make it worthwhile to produce the kinds of soybeans needed for the the operation? If value is to be added by cleaning and processing, some of the return from sales will have to cover a return on the capital invested, and some will permit a higher return for the soybeans themselves.
- If the goal is to produce non-GM soybeans, the second step is to consider non-GMO certification. Traceability and independent certification that GMO content is below customer tolerances, generally 1 to 5 percent when the product arrives at destination involves added costs as well. This begins with cleaning out planting and harvesting equipment and trucks, but requires looking at opportunities for commingling GM and non-GM products all the way to the ultimate destination. With sealed containers, this means to the exit door from the cleaning and processing plant. With bulk shipments, potential commingling continues to the point where title is transferred.



Executive Summary

- A next step is to take stock of the resources available to contribute to making a project happen. From the starting point of a person or organization an idea, a project has to:
 - Build a team to put in place a start up company and plans for staffing and managing the project as it proceeds.
 - Develop the business plan, including a marketing plan for the products.
 - Develop a physical plan for the operation.
 - Raise financing.
 - Build the facility.
 - Manage operations.
 - Handle marketing and sales, distribution and customer service.
 - Continue to plan for the future.
- Some of these resources are probably readily available. For others, the group will have to consider options for drawing on outside expertise. Success will require putting together and team, making decisions and investments to ensure that all are put in place.
- A companion report begins this process by examining the pre-feasibility for a specific cleaning and processing facility.



Table of Contents

▪ Executive Summary.....	i
▪ Map of Kentucky.....	viii
▪ Introduction and Approach.....	1
▪ Domestic Market Assessment	4
– Top U.S. Soyfood Products and Suppliers.....	8
– Dairy Substitutes.....	8
– Meat Substitutes.....	11
– Energy and Nutrition Bars.....	14
– Market Potential as Ingredients for Soyfoods.....	15
– Soy Ingredients Markets.....	18
– Local and Regional Market Opportunities.....	22
▪ Non-GMO and Food Soybean Markets in the U.S.....	27
– Contracting.....	28
– Handling Costs.....	30
– Opportunities for Organics.....	33
▪ International Market Analysis.....	38
– Japan	39
– Other Asian Markets.....	44
– The European Union	45
▪ Conclusions and Recommendations.....	48

Market Solutions LLC has used its best professional effort in undertaking this assignment but assumes no liability for decisions made by those who may read this report.



The Commonwealth of Kentucky



Introduction

- The Kentucky Soybean Association (KSA) retained Market Solutions LLC to conduct an analysis of the market potential for soybeans for food use and a preliminary assessment of the potential for establishing a facility to clean and process non-genetically modified (non-GMO) soybeans for food use in Western Kentucky. This report presents findings of the market analysis. A companion report presents findings of the pre-feasibility assessment.
- The Kentucky Soybean Promotion Board and the Kentucky Agricultural Development Board provided funding to KSA to support this project.
- The Agricultural Development Board's objective is to fund innovative proposals that increase net farm income and affect tobacco farmers, tobacco-impacted communities and agriculture across the state. This is to be accomplished by stimulating markets for Kentucky agricultural products, finding ways to add value to Kentucky agricultural products and exploring new opportunities for Kentucky farms and farm products*.
- The Agricultural Development Board's aim is to develop self-sustaining programs through investments but may include support for operating costs provided that the business plan provides for a phase out of the subsidy.
- In undertaking the project, Market Solutions LLC was told that the objective is to develop a market for 300,000 bushels(bus) of soybeans for food use and 300,000 bus. for processing.

"Suggested Guiding Principles for Agricultural Development Board Action, September, 2000



Objectives

- As detailed in our proposal, this project has three primary components aimed at providing the Kentucky Soybean Association with analysis and a foundation for planning next steps in pursuing market opportunities for non-genetically modified soybeans and products. These include:
 - **Domestic Market Assessment for specialty soybeans** – an overview analysis of trends and market opportunities for specialty, especially non-genetically modified (non-GM), soybeans, including whole soybeans such as ultra-high protein, high protein, natto and high sugar beans, and flour and meal products.
 - **International Market Assessment**, with a focus on the food soybean market in Japan and some information on the market in Europe.
 - **Pre-feasibility assessment for a processing facility**, including options that might best enable growers to take advantage of market opportunities identified in 1 and 2 above. Franklin, KY in Simpson County was suggested as the potential location for the processing facility for which pre-feasibility is analyzed.



Approach

- In undertaking this assignment, Market Solutions assembled data and information from numerous sources and conducted interviews with many of the major U.S. soy foods companies. Interviews were conducted with representatives of soy foods companies in the U.S., Japan and Europe. Technical experts and equipment manufacturers were also consulted.
- Findings presented in a draft report were discussed in a meeting including representatives of the Kentucky Soybean Association and the Kentucky Department of Agriculture in August. Based on feedback received in that meeting Market Solutions solicited comments on the draft report and recommendations for the organization and content of a final report from the Kentucky Agricultural Development Board. We also revised the draft report and conducted additional interviews and analysis to complete the pre-feasibility assessment.
- This report presents findings of the Domestic and International market assessment. A companion report provides findings of the pre-feasibility assessment.



Domestic Market Assessment

- USDA surveys indicate that 74 percent of the soybean acres planted in the U.S. will be genetically modified (GMO) varieties in 2002. KSA members indicate that levels in parts of Western Kentucky may be as high as 90 percent.
- At the same time the soy foods market is growing rapidly, and processors in the U.S. and internationally are looking for non-GMO soy ingredients.
- To best understand the opportunities that this represents for KY soybean producers, the following sections discuss:
 - Developments in soyfoods markets, including recent market growth and future market potential.
 - Developments in the soy ingredients market, which in addition to providing raw materials for soyfoods, are also seeing growing applications in bakery, meat processing and a variety of other uses.
 - Implications for demand for soybeans and products, including product standards and specifications, other requirements.
 - Opportunities for Kentucky soybean producers.



The \$3.2 billion U.S. Soyfoods Market

- Growth in consumer interest in soyfoods in the U.S. was raised substantially by the Food and Drug Administration's (FDA) 1999 approval of a health claim for soy protein's role in reducing the risk of heart disease.
- Soyfoods have gone from a product primarily sold in health food and natural products stores to become a major growth area in the mainstream retail market. Soymilk, and other dairy substitutes, like soy ice cream, soy yogurt and soy cheese; energy bars and drinks, meat alternatives and cereal products are leading the way. An estimated 383 new soy food products were introduced last year, according to Meat & Poultry.
- Overall retail sales of soyfoods in the U.S. grew 16.8 percent, to \$3.2 billion in 2001, according to SPINS/Soyatech data.
- Top sales growth items for the year ended October 2001 included
 - Soy beverages – up 57 percent
 - Energy bars – up 32 percent
 - Frozen, refrigerated meat alternatives – up 11 percent
- Studies report that growth is most rapid in grocery stores, which accounted for 60 percent of total retail sales of soy-based foods in 2000. Natural food stores accounted for about one-fourth of the total in 2000, according to Food Management News.



The \$3.2 billion U.S. Soyfoods Market

- New companies to produce soy-based products are springing up around the U.S., and main stream food retailers are test marketing many new products. At the same time, major food processors have seen the market potential, and some of these are growing through acquisitions of traditional “natural foods” suppliers are start-up ingredients suppliers.
- Soymilk sales reached \$550-660 million in 2001, according to various industry sources. This is an increase from \$420 million in 2000. Sales are projected to reach \$1 billion over the next 3 to 5 years, according to SPINS/Soyatech. The category has seen both growth and change as many new companies have entered the business and major food companies have also bought their way into the business.
- With rapid growth in soyfoods sales through mainstream retail channels, product development, marketing and distribution are all becoming more important for those who want to supply soy ingredients and consumer products.



Market Opportunities in National, Regional and Local Markets

- Even with entry of major food companies into the soyfoods market, there will still be substantial opportunities for Kentucky soybean producers to take part in the growing demand for value added soy products. The competitive situation makes it all the more important that any group that wants to take advantage of the opportunities put together a team that can mobilize expertise in operations, marketing and distribution as well as the soybean supplies and capital to get started.
- The following sections discuss markets for some of the soyfood products that Kentucky producers may consider as ingredient suppliers, or niche product suppliers.
- This is followed by discussion of potential local and regional market opportunities, specifically food manufacturing industries in Kentucky and Tennessee.
- As part of the process of putting together a business plan for a potential new soy processing enterprise, these provide an introduction to potential customers who may buy products that are produced. Potential customers may also be potential business partners, interested in investing to help ensure a supply of ingredients that meet their requirements, or teaming up for processing, marketing and/or distribution.
- This section may also provide producers with ideas for value-added products that might be considered should a new business wish to consider expanding beyond production of ingredients into consumer products.



Top U.S. Soyfood Products and Suppliers

Dairy Substitutes

- Dairy alternatives or substitutes, such as soymilk, soy yogurt, frozen soy desserts (soy “ice cream”), and soy cheese are currently the fastest growing products among consumer soyfoods.
- More than half of soymilk sales were through mainstream food, drug, club and convenience stores in the year ended October 2001, according to SPINS data. Natural products stores account for 14 percent of the total, with other channels accounting for the balance.
- Refrigerated soymilk accounts for two thirds of soymilk sales through grocery stores and mainstream channels, but only 38 percent through natural foods stores. Shelf-stable products make up the balance. Refrigerated soymilk in standard milk cartons was introduced by White Wave in 1996, and could be found in more than 24,000 U.S. supermarkets by 2000.
- Dean Foods, which merged with Suiza (maker of Sun Soy brand soymilk), and recently acquired White Wave (maker of Silk brand soymilk), is using its distribution muscle in the dairy case to build sales of refrigerated soymilk. Nationally, Dean Foods has grown from 3 percent of the dairy market to 30 percent since 1990, through a string of mergers and acquisitions. Sales of White Wave were about \$125 million in the 12 months ending March 2002.



Top U.S. Soyfood Products and Suppliers

Dairy Substitutes

- Other top suppliers of soymilk in 2001 included Westbrae, owned by the Hain Celestial Group, Edensoy, Imagine Foods, Vitasoy USA, which also owns NASOYA, the most popular tofu in the U.S., Pacific Foods, Harmony Foods, 8th Continent, a General Mills/PTI Joint Venture, and Nutra Blend, a Unilever product.
- Many soymilk products use non-GMO soybeans, but some also use organic soybeans as well. Interviews with several companies indicate that they sometimes produce different products, or supply products with different labels depending upon the retail distribution channels. In some cases, manufacturers use non-GMO ingredients but do not label the product.
- American consumers have generally been substantially less interested in whether their food products contain GMO ingredients than consumers in Europe or Japan, where concern has been motivated in part by recent issues with other food products, for example Mad Cow Disease (BSE), Foot and Mouth Disease, and problems with dioxin residues.



Top U.S. Soyfood Products and Suppliers

Dairy Substitutes

- Companies like Hain, Edensoy, Imagine Foods began as natural foods producers and are more likely to look for organic soy products as well as non-GMO. The major food companies are purchasing both non-GMO soy and organic ingredients, and producing products targeting different market segments and price points.
- Some other new soy start up firms are being set up by producer groups that want to add value to their production. Others are independent groups that are looking for reliable and competitively priced sources of raw materials and ingredients.
- It may seem appealing to be able to sell all of the production from a new processing facility to a major food company that has acquired a smaller and successful firm. Large firms may be more likely to look to large suppliers who can meet the full range of their ingredient needs.
- Production from a new Kentucky soy venture may be able to get to these customers by supplying a distributor who services them. There are also important advantages in terms of reduced risk exposure to not being overly dependent on a single customer, but this means that marketing, sales, distribution and customer service have to carefully considered as part of the be planning process.



Top U.S. Soyfood Products and Suppliers

Meat Substitutes

- Sales of meat alternatives reached \$440 million in 2001 according to SPINS data. The category grew by 11 percent in 2001, and suppliers are looking for new products to push growth along faster. Top suppliers of frozen meat substitutes in 2001 included:
 - Morningstar Farms, now owned by Kellogg, with \$110 million in sales
 - Boca Burger, now owned by Phillip Morris/Kraft, with \$41 million in sales.
 - Gardenburger, with \$34 million in sales.
 - Lightlife Foods Inc. (acquired by ConAgra) with sales of \$25 million.
 - Other top suppliers include Amy's Kitchen, Quaker Maid Meats, Franklin Mushroom Farms, Hain Celestial Group, Tivali Soy Protein and Yves Veggie Cuisine (recently acquired by Hain). All have sales of less than \$3 million each.
- Kraft purchased Boca Burger in February 2000, and has increased sales from \$40 million to more than \$70 million in the year ending April 2002. Boca Burger's share of the market has increased from 8 to 22 percent. Kraft has introduced soy-based products that taste more like meat, and also produces separate products targeting health food stores made with soy that is both non-GMO and organic.



Top U.S. Soyfood Products and Suppliers

Meat Substitutes

- Kellogg's Morningstar Farms holds 56 percent of the market, and is introducing new products including a pot pie made with a soy-based chicken substitute.
- Change in the category is best understood by looking at Gardenburger, which held a 37.3 percent share of the meatless burger segment in retail stores, with total sales of \$89 million in 2000, and \$100 million in sales in 1999. The company has been unable to match the marketing prowess and promotional spending by Kellogg and Phillip Morris/Kraft in retail stores.
- In an effort to hold on to its market, Gardenburger's sales and marketing expenses hit 79.9 percent of sales in 1999! It had to cut back in 2000, but sales and marketing costs were still 39 percent of sales.
- While we know that the project sponsors are not planning to promote a product at retail, it is important to understand the competitive pressures that potential customers are facing.
- Gardenburger has recently announced that its sales are recovering, up \$39.5 million for the nine months ended June 30, 2002 by broadening its product line from burgers to include products ranging from meatless meatballs to barbecue riblets. It now distributes to 35,000 food service outlets and 30,000 grocery, natural foods and club stores, according to a Meat & Poultry report.



Top U.S. Soyfood Products and Suppliers

Meat Substitutes

- The Soy Health claim may have gotten consumers to take a new look at soyfoods, but improvements in taste have been a key to growth in consumer demand. With use of enzymes and product formulations to mask “beany” flavors, consumers are reacting much more positively to the new products. Processors are taking advantage of the functional benefits of soy ingredients, in producing low fat products, and products with good taste, texture and mouth feel, while also increasing profitability. This contributed to the introduction of almost 400 soy food products, including meat substitutes in 2001.
- Even fast food restaurants are getting into the act. Burger King introduced a BK Veggie sandwich at 8,200 U.S. restaurants earlier this year. McDonald’s has introduced a barbecued McVeggie Burger at 1,200 restaurants in Canada.
- Consumers eating veggie burgers are not only those who do not eat meat. Burger King reports that some customers even order their Veggie burgers with bacon and cheese. The point is that meat substitutes are starting to find a place along side meat products, just as soymilk has moved into the dairy case.
- A number of meat processors around the country are also getting into this category. Textured soy protein produced by extrusion of soy flours, along with soy concentrates and isolates, are important ingredients of products including meatless burgers, sausage, meatloaf, meatballs and veggie chili that are being sold through restaurants and supermarkets.



Top U.S. Soyfood Products and Suppliers

Energy Bars and Nutritional Supplements

- Sales of nutrition bars exceeded \$1 billion in 2001, according to Nutrition Business Journal data. Nutrition bars target a variety of objectives, most of which offer important opportunities for soy protein. There are categories for
 - Energy and Endurance – often containing 8-26 percent protein along with carbohydrates and fat.
 - Meal replacement/snack bars containing minimum daily requirements for at least 12 essential vitamins, and generally at least 10 grams of protein.
 - Diet/weight loss bars
 - Functional/nutritional bars; and high protein/body building bars
- Power Bar, owned by Nestle, has been the industry leader, but was passed by Clif/Luna bars in 2001. Other brands among the top selling bars including soy protein included:
 - Balance, Zone Perfect, Genisoy, Odwalla (now owned by Coca Cola), Met-RX, Tiger's milk, and Atkins Advantage, according to SPINS, AC Nielsen and IRI data reported by the *Natural Category Buyer*.



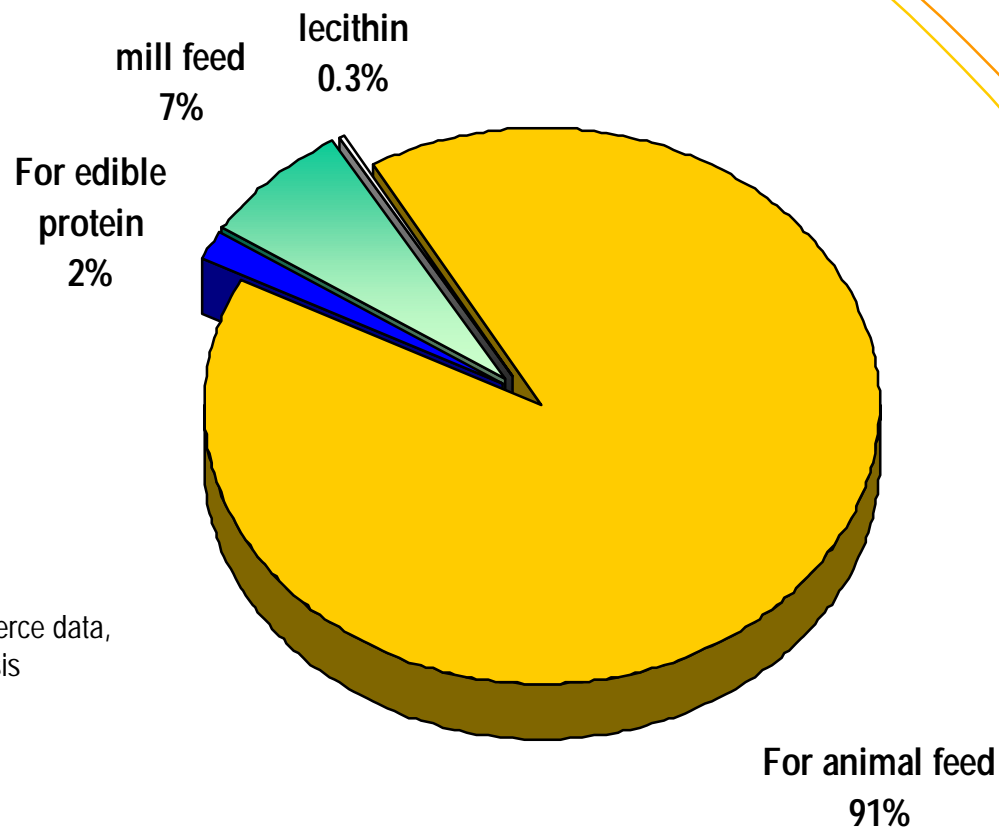
Market Potential as Ingredients Suppliers for Soyfoods

- With rapid growth in the soyfoods market, what does that mean for opportunities as a supplier of soy ingredients to the industry?
- Crushing industry statistics collected by the U.S. Department of Commerce indicate that only 2 percent of U.S. soybean meal, 619,000 short tons in 2000, was used for edible protein, equivalent to about 25 million bushels of soybeans.
- More recent monthly statistics do not show a major jump in production of soy flakes for food use. Integrated soyfoods production that starts with whole, identity preserved soybeans may be undercounted in the official statistics. The statistics may reflect data reported primarily by the major crushers.
- Major players in the crushing industry like Cargill and ADM are placing increasing emphasis on soy protein for human consumption in their product development and investments. Cargill is constructing a new isolate plant in Ohio.
- While the volume of soybean consumption as ingredients for human consumption remains small relative to animal feed, the value per lb of protein in ingredients can be five times that in animal feed. The challenge is to be in a position to capture it.



End Uses of U.S. Soybean Meal

Of 37.7 million short tons of soybean meal produced in 2000, 98 percent was for animal feed and mill feeds, 2 percent for edible protein and 100,000 tons of lecithin. Because of higher unit values, edible protein makes up a higher, though still small proportion of the total value of soybean meal, even if undercounted in statistics.

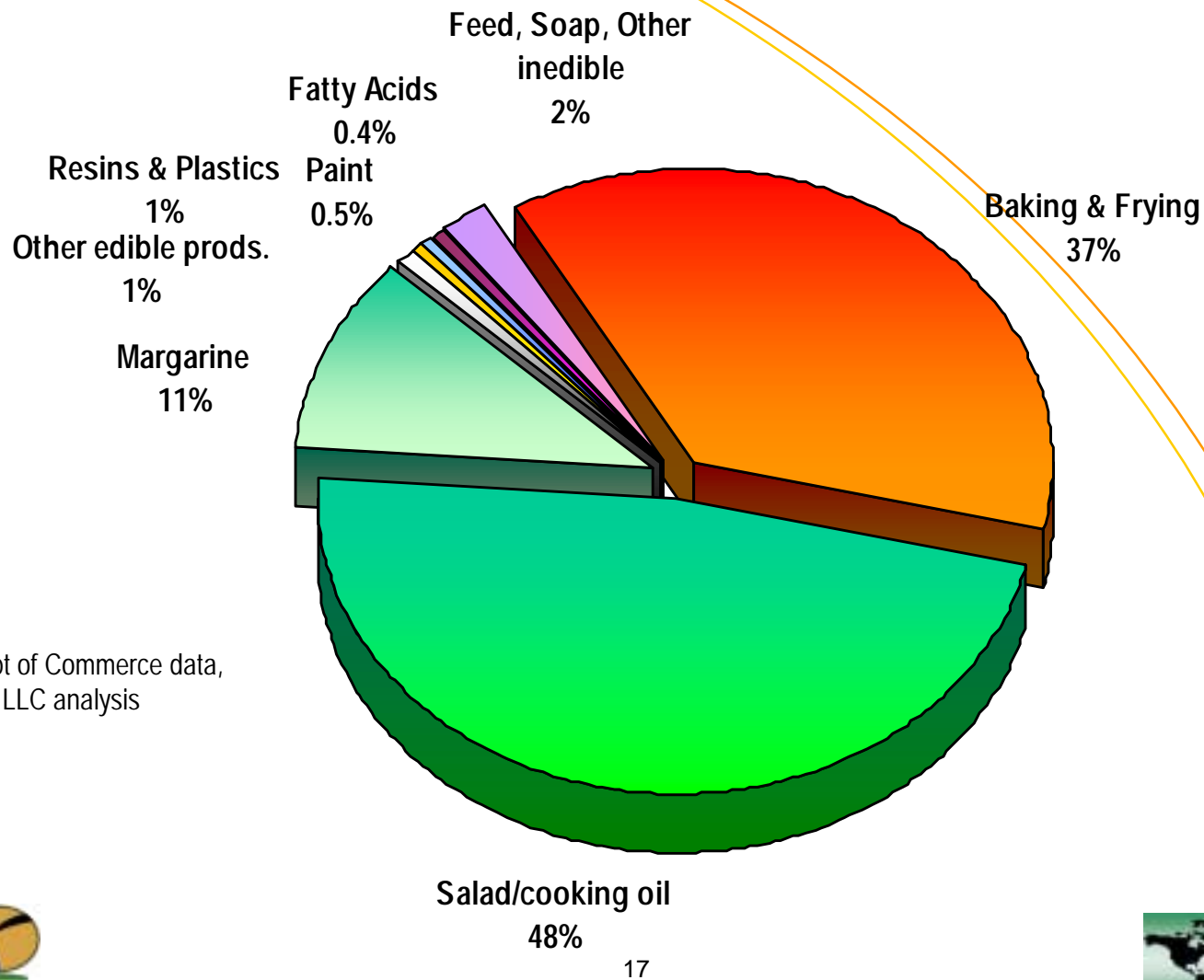


Source: U.S. Dept of Commerce data,
Market Solutions LLC analysis



End Uses of U.S. Soybean Oil

Of 15.5 billion lbs total in 2000, 96 percent was for edible products



Source: U.S. Dept of Commerce data,
Market Solutions LLC analysis



Soy Ingredients Markets

- Most soyfood manufacturers are purchasers of soy ingredients, rather than whole soybeans. Some start with soy flakes, others purchase some combination of soy flours and grits or concentrates and isolates. To understand processing options that might be considered in Kentucky, a quick over view of soy ingredients is useful.
- **Soy flakes** - most soy ingredients begin with defatted flakes that are produced after a solvent is used to extract the oil from the crushed, dehulled soybeans. Some major soy ingredients producers also produce their own flakes, others purchase flakes from major crushers.
- **Full fat flours** can be produced from dehulled soybeans. They are used primarily in Asia and Europe for production of soymilk.
- **Extruded and Expelled Flours and Meals.** Partially defatted flours can be produced by an extruder-expeller from dehulled soybeans from which some oil has been removed. Natural food manufacturers often find E-E meals attractive because they do not require use of hexane or other organic solvents. In dairy and swine feeds, E-E meal is also attractive because of high digestible energy and amino acid availability compared to solvent extracted meal.

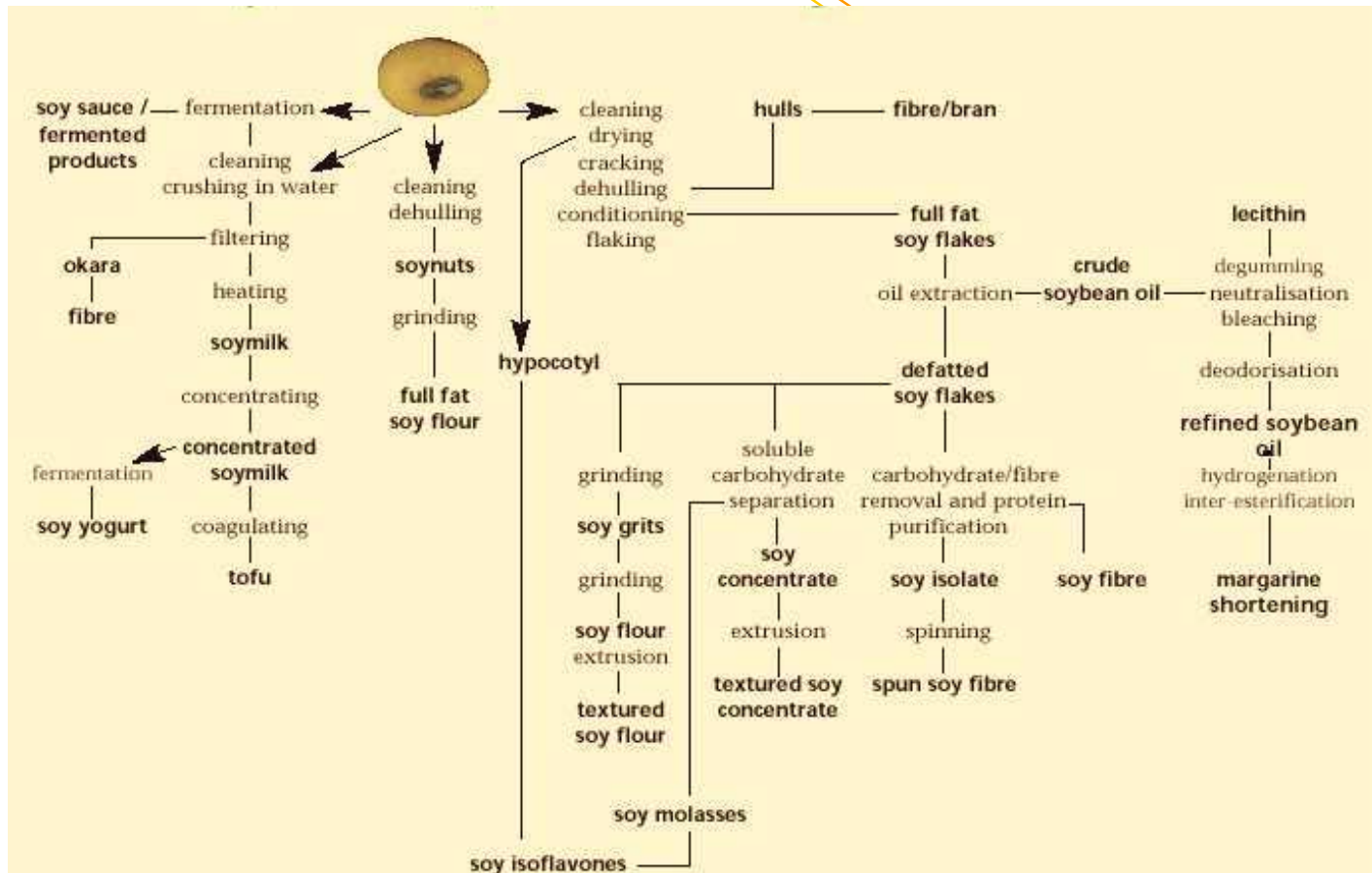


Soy Ingredients Markets

- **Soy flours and grits** are made by grinding and screening soybean flour either before or after oil has been removed. The big difference is in particle size. Protein content ranges from 40 to 54 percent. Soy flours and grits are the least refined form of soy protein ingredients used for human consumption. The kind of heat treatment they receive affects protein functionality, enzyme activity, water dispersibility and functional characteristics for various uses. Extruded soy flours, also known as textured soy protein are used in ground meat, poultry and seafood substitutes.
- **Soy protein concentrates** are defatted soy flour from which most of the water soluble non-protein components have been removed. They contain at least 65 percent protein, while retaining most of the soy's dietary fiber. Concentrates can also be textured by extrusion. They are highly digestible and have a bland flavor compared to flours and grits.
- **Soy protein isolates** are even more highly refined so that they contain at least 90 percent protein. They are used in infant formulas, a variety of applications like nutritional bars and drinks, and meat and dairy applications.



Soybean Processing



Source: American Soybean Assn.



Soy Ingredients Markets

- Soy concentrates and isolates are the highest valued soy ingredients per lb, and also require the highest level of technology and capital investment to produce. Because of their bland flavor, they are in high demand for a number of soyfoods applications.
- Major multinationals are playing a growing role in production of concentrates and isolates, as they have in supplying soy flours. ADM has expanded into soy isolate production and Cargill is building a new isolate plant in Ohio. Bunge has recently purchased assets of the parent company of Central Soya, which has been a major player in soy protein concentrates. Following the lead of Protein Technologies, now owned by Dupont, all of these companies are trying to break away from the commodity market (and pricing) by offering soy based solutions in a growing range of food product applications.
- These investments are an indication that strong market potential exists. The challenge facing Kentucky producers who also want to take advantage of the opportunities by adding value to their production is to avoid direct competition with these large scale and deep pocketed competitors. With a rapidly growing market, this can be achieved by offering specialty products or additional service that larger companies may not provide and/or by targeting customers who may not be large enough or located in places that they can be easily served by the major players.



Local and Regional Market Opportunities

- Soy Ingredients can be used in the production of soy foods. They can also be used as ingredients in a wide range of mainstream processed food applications. As Kentucky producers consider how to market the products from a potential new facility it is useful to think about nearby food processors who might be potential customers.
- Food manufacturers in Kentucky and Tennessee purchase about \$9 billion in ingredients and raw materials annually according to Census figures.
- There were 583 food manufacturing establishments in Kentucky and Tennessee in 1997, 260 of them with more than 20 employees, according to the most recent U.S. Census of manufacturers. Many of these companies are potential customers for soy ingredients.
- As seen in the following chart, companies in the two states that are potential users of products from a new processing facility include:
- **Flour millers**, producing a variety of blended mixes and baking products in which soy flour could be a valuable ingredient. There were 13 millers in the two states in 1997.
- **Fat and oil refiners and blenders**, who may be potential customers for soybean oil, either for refining, or for marketing and distributing a non-solvent extracted soybean oil product that might be produced. Seven companies were identified in the last census.



Local and Regional Market Opportunities

- **Bakeries, cookie, cracker, pasta and flour mix manufacturers** are all potential users of soy ingredients. The census identified 83 companies in Kentucky and 106 companies in Tennessee, including a total of 43 with more than 20 employees.
- **Meat processors.** Soy ingredients are very popular in a variety of meat and poultry products, helping to permit formulation of low fat products, and adding other functionality and value through moisture retention. Textured soy products are also used in meat and poultry substitutes that might be distributed through the same channels as meat and poultry products. Kentucky and Tennessee had a total of 115 companies involved in meat products manufacturing when the census was last taken, 53 of these had more than 20 employees.
- **Dairy product manufacturers and distributors**, including ice cream and frozen dessert producers who might be interested in working with a new venture to produce, market and distribute soymilk, other beverages including soy ingredients, frozen soy desserts, soy yogurt or soy cheese. Thirty nine companies were identified by the census.
- **Snack food manufacturers** who could be interested in soy nuts or soy ingredients for other snack foods, or even producing products like soy butter. Seventeen companies were identified by the census.



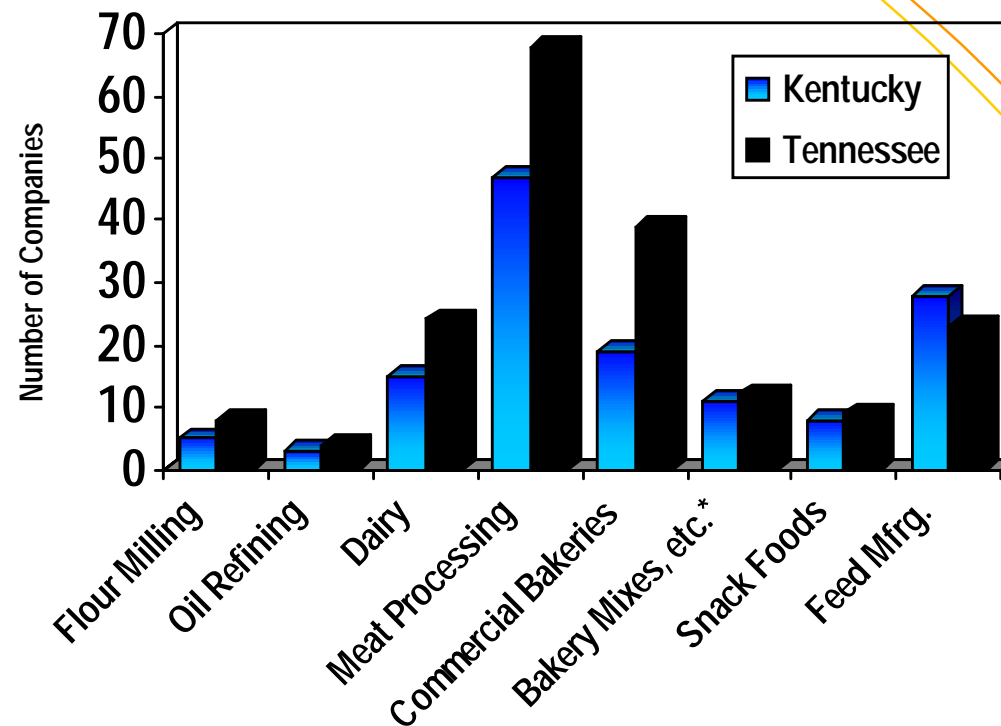
Local and Regional Market Opportunities

- **Feed manufacturers** are also potential customers for extruded soy products, including general animal feed manufacturers and those who also manufacture pet food. While the scope of work for this assignment requested a focus on non-GMO soybeans and products, a processing facility could also handle other soybeans, and even other products, provided that provisions are made for cleanout and segregated storage so that there would not be problems with certification of non-GMO products. Kentucky and Tennessee had a total of 51 feed manufacturers when the last census was conducted.
- We understand that the Kentucky Governor's Office of Agricultural Policy and Kentucky Department of Agriculture have recently conducted a survey of Kentucky food manufacturers that may provide a useful starting place for those considering a project to conduct a more detailed assessment of potential sales opportunities for specific products they would like to produce.



Potential Food Manufacturer Customers in Kentucky and Tennessee

Soy ingredients have a wide variety of applications in food manufacturing for their functional and economic benefits. Some but not all manufacturers will want only non-GMO ingredients. Some will also want organic products.



* Includes manufacturers of bakery mixes from purchased flour, cookie, cracker and pasta mfrs.

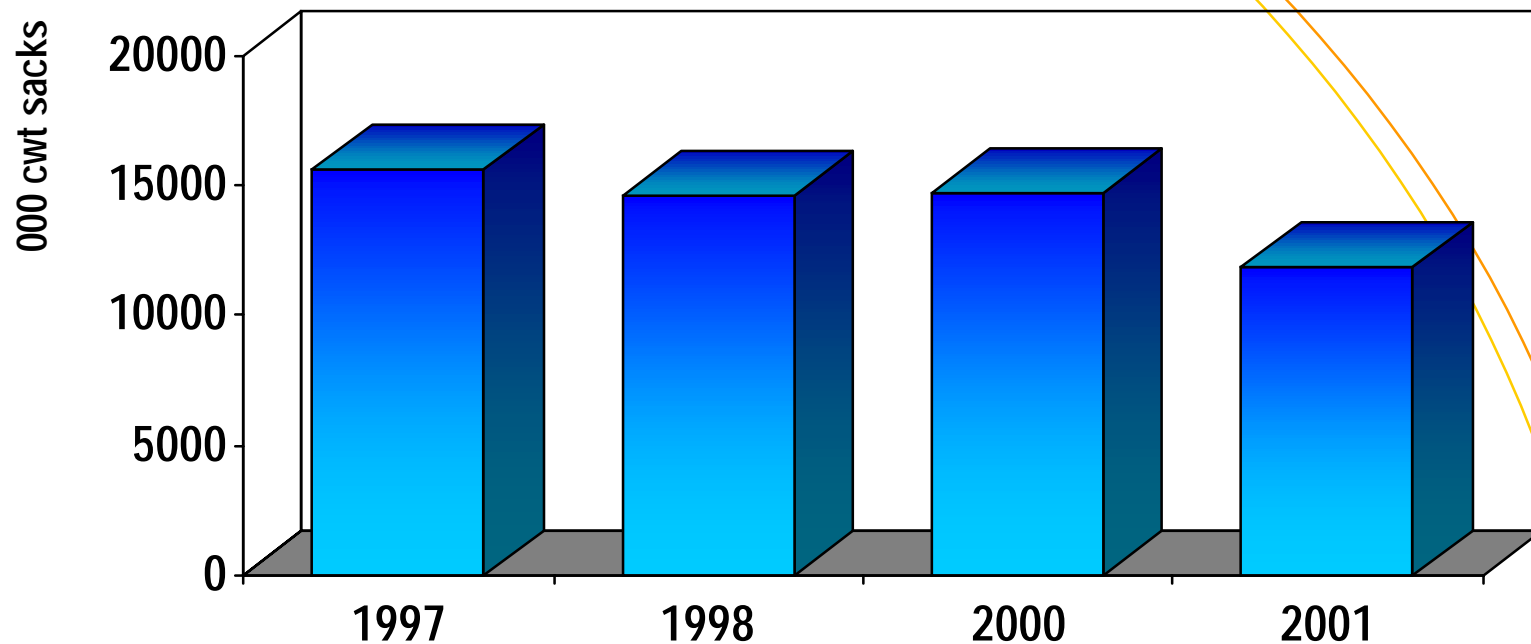
Source: U.S. Census Bureau, 1997 Economic Census data, Market Solutions LLC Analysis



Wheat Flour Production in Tennessee

One possible outlet for soy flour is in blends with wheat flour. Use of soy flour can be used to replace dairy and egg ingredients in a variety baking applications. In 2001, Tennessee produced 11.9 million cwt sacks, about 3 percent of national production. Milling capacity in Hopkinsville, KY has been expanding since the last Economic Census when Kentucky flour production was valued at \$57 million. A 300,000 bushel soybean plant could produce about 14 million lbs of soy flour.

Blended flour products alone could provide an outlet for a substantial share of production.



Source: U.S. Dept of Commerce data, Market Solutions LLC Analysis



Non-GMO and Food Soybean Markets in the U.S.

- The food soybean market has been growing rapidly across the U.S., both to supply the domestic soyfoods industry and to supply export markets.
- A recent University of Illinois survey of 80 companies handling specialty corn and soybeans* found that about 40 percent of non-GMO soybeans produced there are exported, while 100 percent of the clear hilum varieties are exported. Japan is the largest market for clear hilum varieties.
- While some non-GMO and specialty food beans are being handled in 30 kg bags and containerized identity preserved shipments, there is a growing move toward bulk handling of non-GMO beans, especially those headed for crushing for the feed industry.
- For the 2001 crop, ADM announced that it would pay a 20 cent per bushel premium for non-GMO soybeans delivered to its Decatur, IL crushing plant. It was paying a 10 cent per bushel premium for deliveries to river elevators. The burden of proof is placed on growers to show that their deliveries do not contain GM varieties. This can be viewed as a base for premiums that can be received for other varieties.

*Source: Good and Bender, September, 2001



Contracting for Food Soybeans

- As Kentucky farmers consider options to produce, process and market non-GMO and specialty soybeans, contracting arrangements will be an important consideration. Contracting is becoming more important. The way contracting operates affects the opportunities, costs and risks.
- We understand that a number of Kentucky farmers are already producing specialty soybeans under contracts from various elevators, processors and handlers, and that premiums of as much as \$1.30 per bushel are being received. In considering alternatives to current arrangements, it will be important to consider how the market is developing, where the market potential lies, and what the requirements in terms of added services and costs are likely to be.
- The Illinois survey mentioned above found that 61 percent of the clear hilum soybeans were being produced under contract, while 19 percent of all non-GMO varieties were contracted. Even higher percentages of STS soybeans and specialty corn are being produced under contract.



Contracting for Food Soybeans

- The Illinois survey found that among ten handlers of non-GMO soybeans responding, 60 percent of the producer contracts for non-GMO soybeans specified the number of acres to be produced, while 40 percent specified the number of bushels to be delivered. 47 percent of contracts called for delivery at harvest, while 53 percent left delivery to the buyer's call. Premiums reported ranged from 10-15 cents per bushel, averaging 12 cents, generally over the local cash price. None of the contracts provided a monthly storage premium while waiting for the buyer to call for the product. For other products, the storage premium averaged about 1 to 2 cents per bushel per month.
- Handlers in turn contracted with buyers for the non-GMO soybeans for which they contracted with farmers. The survey found that half of these were acreage contracts and half specified deliveries in bushels. Only 4 percent of these contracts called for delivery at harvest. 11 percent specified a delivery date, and the balance left delivery to the buyer's call. 78 percent of contracts called for delivery to a processor and 22 percent were for delivery to an exporter. Those surveyed indicated that processors paid the same premium of 10-15 cents per bushel above their normal price, but some also received an additional payment of 3-5 cents per bushel.



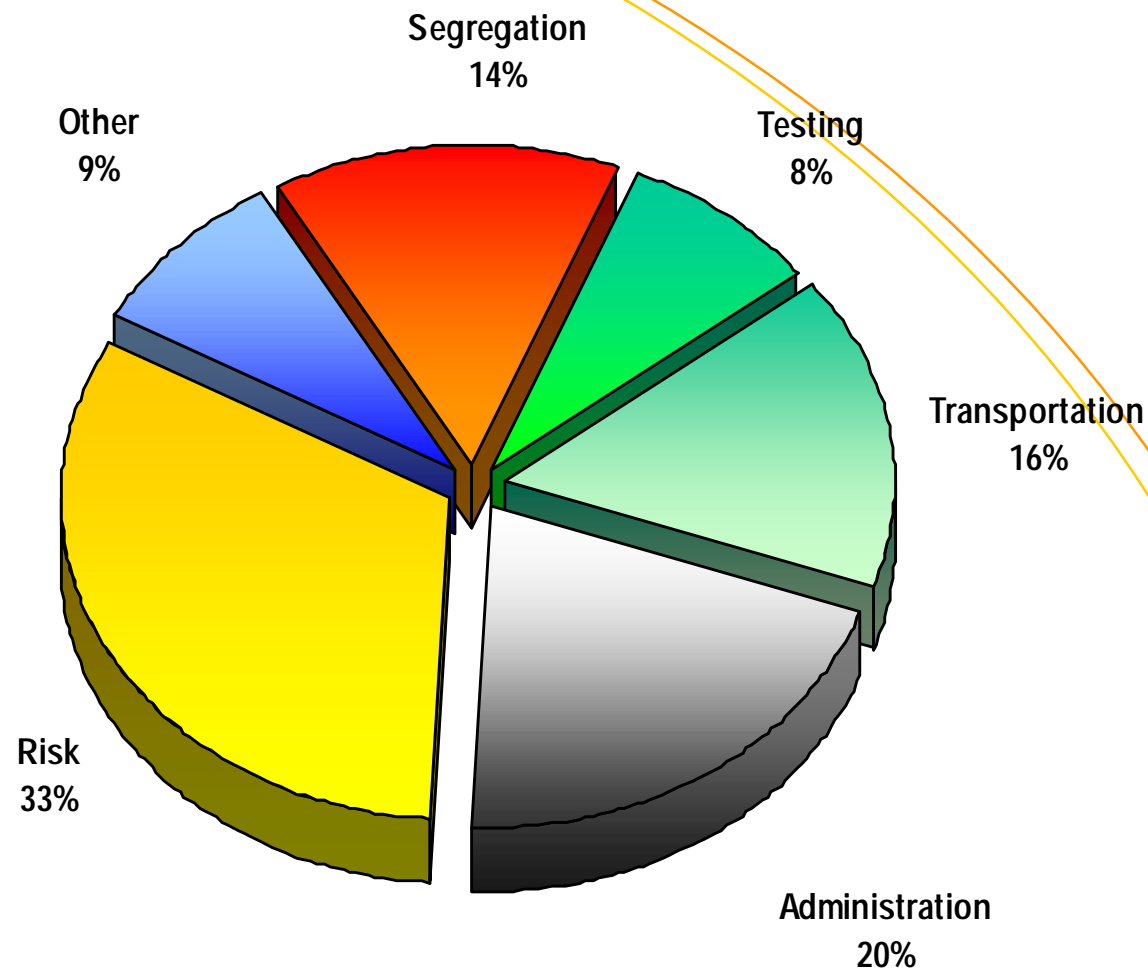
Handling Costs for Specialty Soybeans

- Those responding to the survey reported that the additional cost of handling non-GMO soybeans averaged .08 per bushel, while the average return was .05 per bu, generating a negative net margin. Average costs reported for clear hilum soybeans were slightly higher, but with slightly higher premiums, the net margin was slightly less negative.
- A 1998 survey of Illinois elevators obtained additional details on handling of non-GMO and tofu soybeans. Among those surveyed, the quantities of non-GMO soybeans handled ranged from 36,000 bushels to 420,000 bus. Among those handling tofu, or clear hilum varieties, quantities handled ranged from 5,000 to 1.4 million bushels.
- While distances between seller and delivery points ranged widely, they averaged 19 miles for non-GMO beans and 45 miles for tofu beans.
- In the earlier survey, premiums paid averaged 26.4 cents and ranged from 15 cents to 1.25 per bushel. Handlers reported receiving premiums averaging 34.6 cents per bushel. Additional handling costs were also reported to be lower, and did not generally include the testing and analysis that have now become a necessity.

*Source: Good and Bender, September, 2001, Good, Bender and Hill, 2000



Additional Receiver Costs of Bulk Handling Non-GMO Soybeans 2000-2001 Illinois Survey 8.08 cents per bushel total added cost



Source: Good and Bender, 2001 data,
Market Solutions LLC analysis



Future Markets for Non-GMO and other Specialty Soybeans

- As the share of GM soybeans in the U.S. continues to increase, and as it becomes more difficult to obtain non-GMO soybeans from Brazil, there will be increased difficulty for buyers in Asia and Europe who want non-GM soybeans to obtain them.
- This could be expected to lead to a resurgence in premiums. Some observers also believe that it will ultimately lead to wider acceptance of GM soybeans, so that the non-GMO market will remain a niche opportunity.
- At the same time, as the next generation of GMO varieties with specialty end-use characteristics increases, other niche markets for specialty soybeans can be expected to develop.
- *As Kentucky producers look at ways to increase returns, non-GMO and specialty soybean production should be considered along with ways to improve the value of all production, such as selecting varieties with end use characteristics like higher protein and oil content, and working to obtain premiums for the added value.*



Opportunities for Organic Products

- While we understand that there is little interest in organic production, interviews and our analysis indicate that there are growing opportunities for those who are willing to make the investment in certification under USDA's new standards.
- Only 0.2 percent of U.S. farmland is used for organic production, but various industry sources indicate that the retail organic products market has grown from \$1 billion in 1990 to \$5.8 billion in 2001.
- Organic soyfoods are expected to continue as the fastest growing component of the organic market with growth continuing at about 100 percent annually compared to overall growth in the organic market of 37-38 percent annually, according to sources cited by *Food Technology*. Consumer research indicates that many of the people who purchase organic products are the same people who have concerns about GMOs.
- Among soyfoods manufacturers, Soyatech found that in 2001 90 percent of U.S. soymilk and tofu manufacturers use some or all organic soybeans, up from 75 percent in 1995. This is consistent with Market Solutions findings in interviews with a variety of soy foods manufacturers.



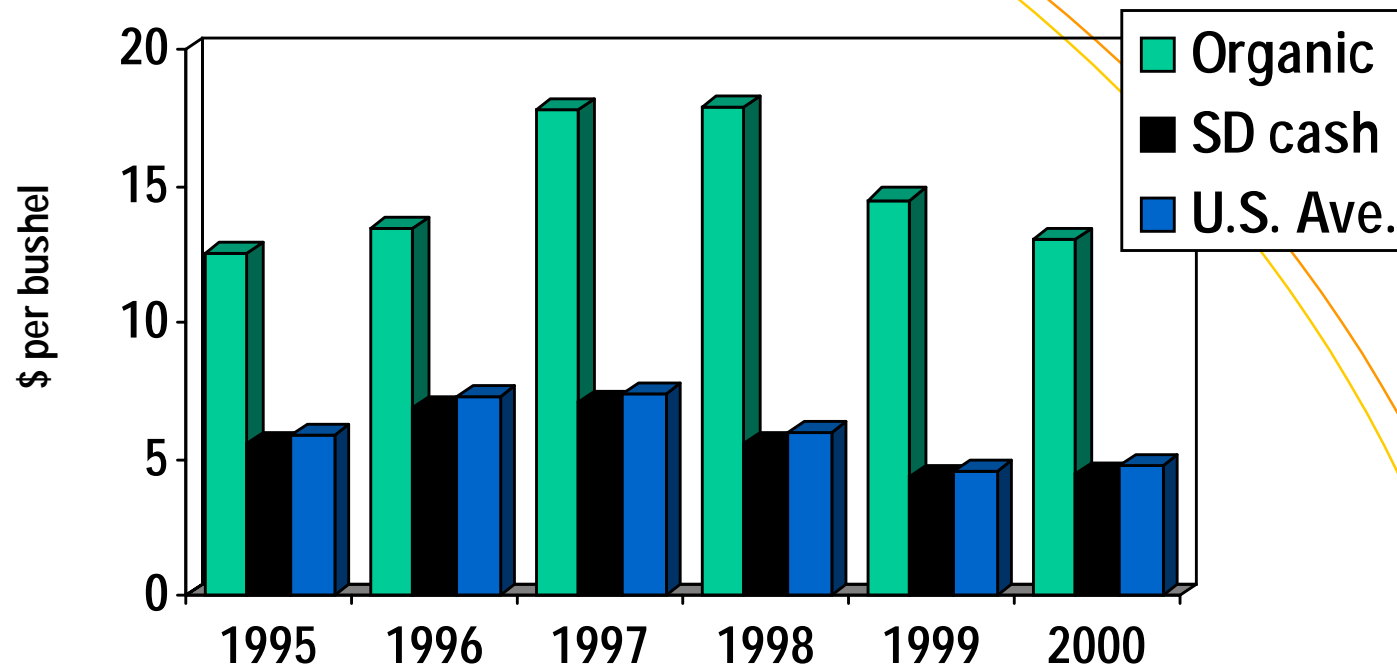
Opportunities for Organic Products

- Non-GMO and organic soy ingredients can also find opportunities in baking products, entrees and frozen foods and snack products aimed at consumers in the organic market.
- There may also be opportunities in pet foods and animal feeds. U.S. sales of organic pet foods alone grew from about \$10 million in 1998 to \$29.4 million in 2001 according to the *Natural Category Buyer*.
- With sales of organic meat and poultry up 64 percent in 2000 and expected to grow at 31 percent annually through 2005 there will be opportunities for some in providing ingredients for animal feeds and pet foods.
- Internationally, some consumers in Europe and Japan are also willing to pay more for organic products. The chart on the following page shows the premium paid for organic, clear hilum soybeans destined for export from South Dakota. Prices for the preferred variety, Vinton, were more than 3.5 times the price for commodity beans, though some added costs were also involved.



Organic vs Conventional Soybean Prices in South Dakota

Organic average is about 3 times conventional



Organic beans are clear hilum variety, cleaned, authors report that prices for Vinton variety were even higher than those cited here
Source: Bertramsen and Dobbs, SD State Univ.data, Market Solutions LLC Analysis



Domestic Market Opportunities

Conclusions

- With approval of the health claim for soy protein in reducing the risk of heart disease, and progress on improving the taste of soyfood products, the domestic market has been growing very rapidly. Once primarily sold through health food stores, soyfoods are now moving through regular supermarkets around the country. Soy milk and other dairy substitutes, chilled and frozen meat substitutes, energy bars and beverages are all seeing rapid growth.
- Soy ingredients are also playing a bigger role in blended flours, meat alternatives, bakery products, snack foods and other products. Soy flours and grits, soy concentrates and isolates are all finding new applications. Soybean oil that has not been solvent extracted is also finding markets in food processing and at retail.
- Almost 400 new soyfood products were introduced in 2001, all require ingredients. Major food companies like Kellogg, Kraft and Dean Foods are buying into the market. In some cases, buying up successful smaller companies and their products, replacing some of the traditional natural foods suppliers of soyfoods.



Domestic Market Opportunities

Conclusions

- Rapidly growing demand has attracted attention from a number of producer groups and others interested in adding value to soybeans. Soyfoods manufacturers and other food processors are looking for non-GMO soy ingredients. Many are also looking for organic ingredients as well.
- The major commodity grain and oilseed processors also see these opportunities and are making investments to increase their competitiveness as ingredient suppliers to the soyfoods industry and to food manufacturers in general.
- This will not eliminate the opportunities for smaller suppliers. It will mean that with increased competition smaller suppliers will have to look for ways to make themselves different, focusing on niche products and customers who may not be as important to large suppliers.



International Markets for Food Soybeans

- Japan as a market for food soybeans
- Other Asian markets
- Developments in the European Union Market for Non-GM Soybeans



Developments in the Japan Market for Non-GM Soybeans

- Japan is a premium market for food grade soybeans. For producers who make the investment in developing production of soybean varieties that meet the needs of Japanese processors, and who can build the relationships with customers, there are long term, high value opportunities.
- Japan uses non-GMO food soybeans to produce tofu, natto, miso, vegetable protein, soy sauce, soy milk and as cooked beans. Total consumption is about 960,000 metric tons annually (36 million bus). Soybeans for tofu represent more than half of the total.
- High grade local soybean varieties and some imported specialty food grade soybeans have traditionally been used for higher quality tofu. Bulk and Identity preserved soybeans from Indiana, Ohio and Michigan (IOM) and larger beans screened from imported No. 2 yellow soybeans from the general import stream have been used in producing commodity tofu products.
- Since genetically modified soybeans became an issue, the market has changed. The traditional futures contract for Indiana, Ohio and Michigan (IOM) soybeans, used to hedge imports, has been supplemented with a contract for non-GMO soybeans. The standard for the new contract, introduced in May 2000 is 10 metric tons/ 367 bushels of non-GMO varieties, identity preserved, non-screened, stored in a silo. Parcell reports that for the April 2002 contract, 150 non-GMO contracts were delivered on and 173 conventional soybean contracts.



Developments in the Japan Market for Non-GM Soybeans

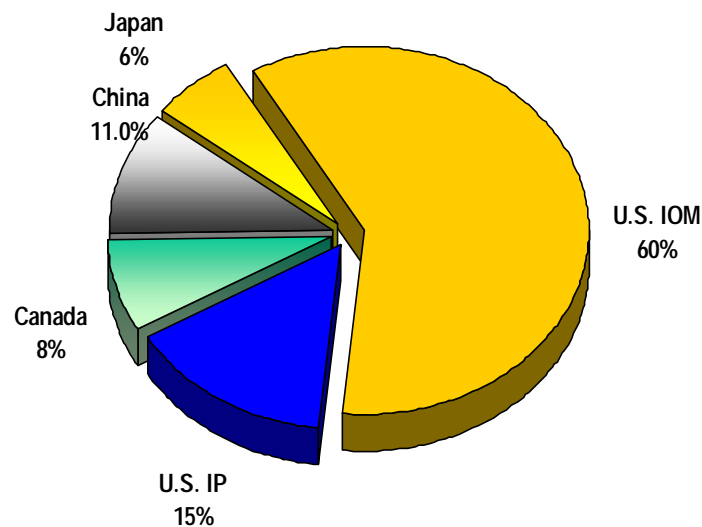
- Japan introduced a mandatory labeling law that took effect in April 2001 with a 5 percent tolerance for labeling a product as “GMO free.” Civil penalties were introduced for inappropriately claiming that products are “GMO free.” This has increased the risk to buyers of purchasing “non GMO” soybeans that could not pass the test to be labeled as “GMO free.” This resulted in increased requirements for independent certification from sellers, and led to the non GMO soybean contract trading at a discount to the conventional contract for a time.
- Suppliers and buyers are now addressing this issue with requirements for independent certification. Those who want to sell soybeans at a premium as non-GMO now have to be able to document that to be the case. It was recently reported that in tests of soybeans imported in Japan as organic, almost one-third tested positive for the presence of GMOs. This is likely to increase attention to independent certification. For Kentucky producers it just means that this needs to be part of the planning process for a new enterprise.



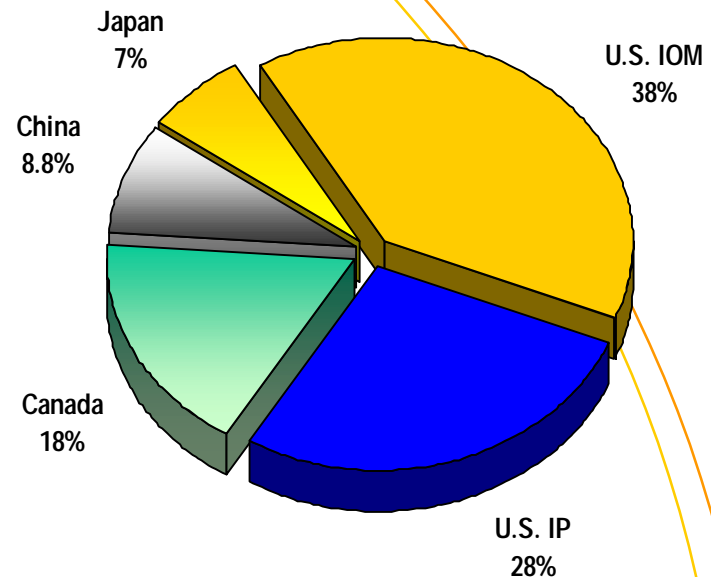
Role of IP Soybean Shipments to Japan has grown since GMOs became an issue

Most Japanese food soybean imports were bulk IOM beans before

1.2 million metric tons in 1998



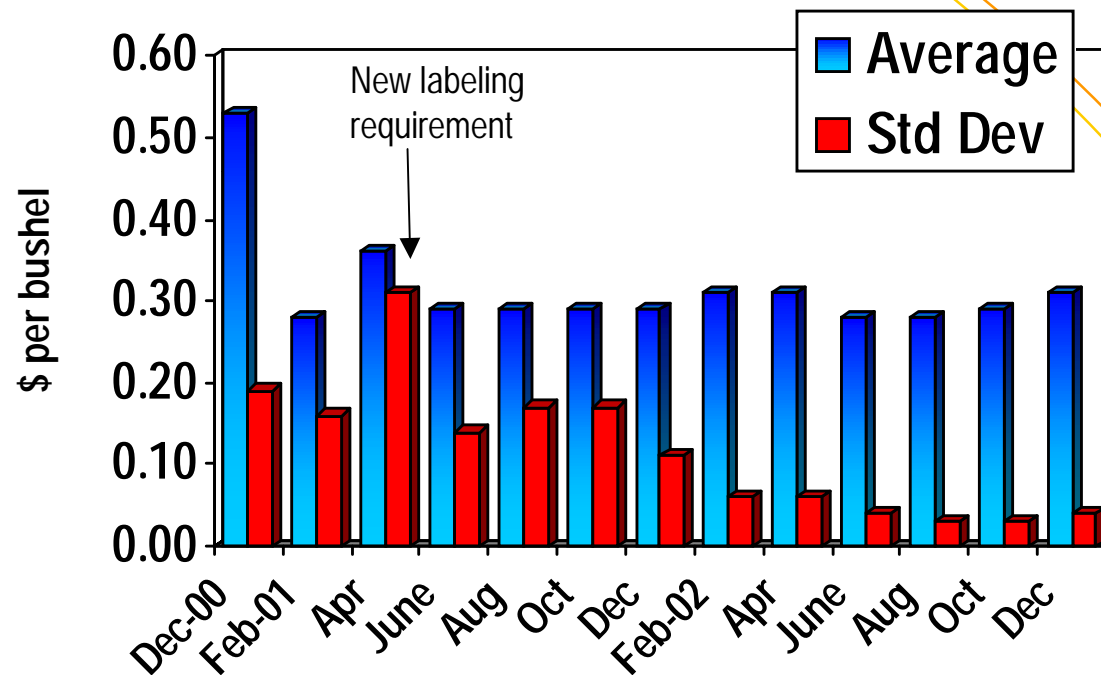
1.2 million metric tons in 2001



Source: Shokuhin Sangyo
Shinbun-sha, ASA, Market
Solutions LLC analysis



Non-GMO Soybean Contract Premiums in Japan Compared to Conventional IOM Soybean Contract



2002 Contract values as of March 22, 2002

Source: Joe L. Parcell U. of MO data, Market Solutions LLC Analysis



Japan as a Market for Food Grade Beans

- Prices in the Japanese market for IP food grade soybeans vary considerably depending upon the variety, purity and perceptions of value for specific uses.
- In recent years, domestic Japanese food soybeans have often sold for prices three times those of bulk shipped imported clear hilum 95 percent pure Canadian soybeans. Top grade imported IP beans of preferred varieties, 99 percent pure often sell for half the price of Japanese varieties, but still more than double the U.S. price.
- Trade interviews indicated that domestic Japanese food soybeans were selling for about \$35 per bushel, while top grade imported IP beans of preferred varieties, 99 percent pure were selling for about \$17 per bushel, second grade IP beans were selling for about \$14 per bushel, and bulk shipped 95 percent pure Canadian clear hilum soybeans were selling for about \$11 per bushel.



Other Asian Markets for Food Grade Soybeans

- Tofu and Soymilk are a standard part of diets throughout Asia. In the past, soybeans for food use have been screened from shipments imported for crushing. With concerns over GMOs and labeling requirements in a growing number of markets, opportunities for food grade non-GMO soybeans are increasing. There are also some organic imports. Returns are likely to be lower than in Japan, but quality standards may be slightly more flexible.
- Consumption of tofu in Taiwan has been 66 lbs per person. IP imports of food grade soybeans began with imports of about 90 mt in 1997. This increased to 350 mt by 1999. Imports of organic IP soybeans grew from 100 mt to 240 mt between 1998 and 2000. Kentucky producers interested in the market will face competition from other U.S. producers, as well as producers from Canada and Australia. Now that Taiwan has become a member of the WTO, competition in the market is likely to increase, though Taiwanese consumers traditionally have a strong preference for U.S. products.



The European Market for Non-GMO Soybeans

- Out of about 30 million metric tons of soybean use in the 15 member countries of the European Union (EU-15), ASA estimates that 600-800,000 metric tons go into soy foods.
- European consumers have faced the strongest negative publicity surrounding genetically modified products. EU regulations on sale of products as non-GMO have a one percent tolerance and require certification, traceability and labeling (Council Regulation 49/2000).
- Some European retailers have been pushing hard for products that can be labeled non-GM and often organic as well, including poultry and meat products raised on non-GM feed ingredients. This is getting increasingly difficult to be workable as supplies of non-GM soybeans are reduced. The EU has had a ban on approval of new GM varieties which was recently relaxed. A number of experts on EU politics expect that this will eventually lead to broader acceptance of GMO soybeans.
- Nonetheless, some level of demand for non-GMO products is likely to remain. A number of European retailers, especially in the UK and Germany, have bans on products containing GM ingredients. The big question is what consumers we be willing to pay for non-GM products and how many will do so. For Kentucky producers there can be some short and medium term opportunities for conventional varieties of non-GM soybeans in Europe, though prices will be substantially lower than for sales of specialty food soybeans sold to Japanese consumers.



The European Market for Soyfoods

- Market opportunities as suppliers of soybeans, ingredients and products to Europe can be looked at in several categories:
- **Traditional soyfoods** : tofu, soy milk, whole soy flour, whole dried soybeans, green soybeans, soy sprouts, fermented soyfoods (tempeh, miso, natto and soy sauce), ...
- **Modern soyfoods** (soy protein ingredients): (defatted) soy flour(s), soy concentrate, soy protein isolate, textured soy protein (TSP), soynuts, soy grits, ...
- **Second generation soyfoods**: tofu burgers and veggie burgers, hot dogs and sausages, soymilk and drinks, desserts and cheese, soy yogurt, soy ice cream, snacks and bars, ...
- **Soy nutraceuticals**: isoflavones, phytosterols, lecithin, saponins, phytic acid, phytosterols, protease inhibitors, ...
- Market Growth prospects according to ASA Europe, vary by product group:
 - Traditional and Second Generation soyfoods are seeing growth at 20-30 percent per year
 - Soy protein ingredients markets are growing at 5-10 percent annually. Growth has been slowed by the GMO issue as well as failure of the EU to agree on standardized rules for a soy health claim.



International Market Opportunities

Conclusions

- Some Kentucky soybean producers are already taking advantage of international market opportunities for producing non-GMO food grade soybeans for the Japan market. These are genuine market opportunities, and if Kentucky producers can meet the requirements of the Japan market and sell directly, there is substantial opportunity for higher returns. Prices in Japan are generally more than double U.S. prices, even higher for preferred varieties and organic production. Success in obtaining a larger share of those returns will involve added costs and risks, and require some additional investments.
- Considerations in looking at options to increase international sales of non-GMO food grade beans include the ability to cost effectively produce varieties that meet customer requirements, and to certify, clean, size, bag, and ship products on a consistent basis.
- Producers will have to consider the impacts on potential costs of production, harvesting, cleaning and transport, taking into account impacts on yields and the requirements to be able to certify products as non-GMO.
- Transportation costs are often a critical factor influencing the share of the delivered price that is ultimately available to producers. With the importance of containerized shipments of auto parts from Japan to Kentucky, shippers should be able to develop competitive backhaul rates to West Coast ports and on to Japan. It also makes sense to capitalize on the Commonwealth of Kentucky's long term relationships with Japan to build direct soybean sales.



Market Analysis

Conclusions and Recommendations

- The above market analysis identifies a wide range of opportunities that Kentucky soybean producers can consider as part of a strategy to increase net farm income and develop alternatives to tobacco production.
- Specific opportunities have been suggested in producing ingredients for soyfoods, ingredients for mainstream manufactured food products; and international opportunities for food type soybeans.
- For any business organization or producer group interested in pursuing specific opportunities, the next steps should include:
- Identifying the market objectives that are of highest interest with as much specificity as possible with a goal of developing a business plan.
- The first step is to look at the varieties that can currently be grown. Whether the goal is to produce traditional non-GMO varieties for processing or specific food grade beans for tofu or natto, it is important to assess what can be produced and what additional costs are involved.



Market Analysis

Conclusions and Recommendations

- The second step is to consider non-GMO certification. Traceability and assurance that GMO content will be below 1 to 5 percent when the product arrives at destination involves added costs as well, starting with cleaning out planting and harvesting equipment and trucks, but looking at opportunities for commingling GM and non-GM products all the way to the ultimate destination. With sealed containers, this means to the exit door from the cleaning and processing plant.
- A next step is to take stock of the resources available to contribute to making a project happen. From the starting point of a person or organization an idea, a project has to:
 - Build a team to put in place a start up company,
 - Develop the business plan, including a marketing plan for the products.
 - Develop a physical plan for the operation,
 - Raise financing,
 - Build the facility,
 - Manage operations,
 - Handle marketing and sales, distribution and customer service, and
 - Continue to think about the future.
- Some of these resources are probably already available. Success will require making decisions and investments to ensure that all are put in place.



Market Solutions LLC

4306 Leland Street, Suite 101
Chevy Chase, MD 20815 USA

Phone: (301) 654-2949

Fax: (301) 654-4742

E-mail: MarkNewman@marketsrus.com

On the web: www.marketsolutionsllc.com

